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REMARKS

In the Office Action of June 28, 2004, the Examiner:

- Objected to claims 4, 7-9, 17, 20-22, 30 and 33-35 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.
- Rejected claims 1, 2, 10, 12-15, 23, 25-28, 36 and 38-39 under 35 U.S.C. 102(e) as being anticipated by Stoutamire (US 6728852)
- Rejected claims 3, 5-6, 16, 18-19, 29 and 31-32 under 35 U.S.C. 103(a) as being unpatentable over Stoutamire in view of Bereznyi (US 6453404).
- Rejected claims 11, 24 and 37 under 35 U.S.C. 103(a) as being unpatentable over Stoutamire in view of MacDonald (US 5696927).
- Indicated that claims 4, 7-9, 17, 20-22, 30 and 33-35 contain allowable subject matter.

Under this amendment, claims 1-39 are pending in this application. Claims 1-2, 4-5, 11, 13-18, 24-25 and 37 have been amended. Applicant submits that the amendments curing informalities are not being made for purposes of patentability. No new matter has been added by virtue of this amendment to the claims. For the reasons below, Applicant respectfully requests entry of the amendment and reconsideration of the pending claims.

Objection to the Claims

In the Office Action, the Examiner objected to claims 4, 7-9, 17, 20-22, 30 and 33-35 as

being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. The Applicant respectfully disagrees.

Dependant claims 4, 7-9, 17, 20-22, 30 and 33-35 depend from and include all of the limitations of independent claims 1, 14 and 27 which are allowable for the reasons set forth below. For this reason, the Applicant respectfully requests withdrawal of the Examiner's objection and allowance of these claims.

Rejection under §102

In the Office Action, the Examiner rejected claims 1, 2, 10, 12-15, 23, 25-28, 36 and 38-39 under 35 U.S.C. 102(e) as being anticipated by Stoutamire (US 6728852). The Applicant respectfully disagrees.

The Stoutamire patent is directed to a method for creating compressed versions of regular objects in order to reduce the amount of memory used by applications or programs executing within an object-based computing system, thereby increasing the performance associated with the object-based computing system. The method includes storing a first representation of a set of data on a heap structure of an object-based computing system. The method includes determining when the first representation of the set of data is suitable for compression. If the first representation of the set of data is compressible, it is compressed to form a second representation of the set of data, and a second portion of memory is allocated on the heap structure. The second portion of memory is substantially smaller than the amount of memory occupied by the object, e.g., is smaller than a first portion of memory occupied by the object. Finally, the method

includes writing the second representation of the set of data into the allocated second portion of memory. See Abstract of Stoutamire specification.

Note that Stoutamire discloses only one heap or memory structure wherein objects are written or copied to different portions of the single heap or memory structure at issue. See col. 4 lines 46-54. Stoutamire does not disclose a contiguous linear portion of storage including a first heap and a second heap located at opposite ends of the storage portion, wherein any gap between the two heaps in an unallocated region of storage, as disclosed in Applicant's independent claims 1, 14 and 27. This is a critical difference between Stoutamire's patent and Applicant's invention because the use of two heaps eliminates the problem of starting a new Java Virtual Machine (JVM) for every transaction.

As explained in the Background section of Applicant's specification, in a server environment having a JVM architecture used for database transactions, each transaction is typically performed as a separate application, rather than as different threads within an application. This is to ensure that every transaction starts with the JVM in a clean state. In other words, a new JVM is started for each transaction (i.e. for each new Java application). Unfortunately this results in an initial delay in running the application. Typical startup of a JVM involves loading roughly 1000 objects created from many different classes (see Applicant's specification, p. 17 lines 22-25). The overhead due to this frequent starting and then stopping a JVM as successive transactions are processed is significant, and seriously degrades scalability of Java server solutions.

Applicant's invention solves this problem using the two heaps claimed in Applicant's independent claims 1, 14 and 27. As further described in claim 2 of Applicant's invention, the

first heap is used for storing objects that are deleted at the end of the current transaction, and the second heap is used for storing objects that persist from one transaction to another. This eliminates the frequent starting and stopping of the JVM and loading of classes as successive transactions are processed, thereby increasing performance. This performance gain cannot be realized without the two separate heaps claimed in Applicant's independent claims 1, 14 and 27.

The existence and use of two separate heaps is described by the Applicant with reference to FIG. 5 on pages 24-26 of Applicant's specification. FIG. 5 shows two separate heaps 510 and 520. The middleware heap 510 is used for storing objects that persist from transaction to transaction while transient heap 520 is used for storing objects that are de-referenced, unallocated or reset between transactions. This structure including the two heaps allows the same JVM to be reused from transaction to transaction without resetting or restarting different JVMs.

The use of multiple heaps for different types of objects further allows the handling of the heap to be fine-tuned to the requirements of those types of object. For example, it may be desirable for the transient heap to allocate a larger thread local heap cache. In addition, utilizing a single block of memory for the transient and middleware heaps improves space usage, in that a given region of memory can be flexibly assigned to either heap, depending on particular application requirements. Thus, as more and more objects are created, there is a choice to either enlarge the size of the heap, or to perform a garbage collection to maintain the heap within current size limits. The former option is generally quick, but will eventually lead to the exhaustion of heap space. In contrast, garbage collection is relatively slow, since it interrupts processing, but does constrain the heap size to within predetermined limits. Overall, the Applicant's invention avoids garbage collections during transactions as much as possible,

thereby optimizing performance for the transaction, and to rely instead on a heap refresh process, which is performed at the end of the transaction as part of a JVM reset process. See pages 29-30 of Applicant's specification. These advantages and features are dependant upon the existence of two separate heaps, as claimed in Applicant's independent claims 1, 14 and 27.

The use of multiple heaps for different types of objects further allows the use of multiple and different expansion policies for each heap. This allows for additional customization of memory processes to fit the objects being handled. Claim 6 of the Applicant's invention, for example, describes an expansion policy that allows a heap to expand into an unallocated region in order to satisfy a storage request. Claim 8 of the Applicant's invention, for another example, describes an expansion policy that allows a heap to expand into an unallocated region, only up to a predetermined point, in order to satisfy a storage request. For a more detailed discussion of different expansion policies, see pages 26-35 of Applicant's specification. These advantages and features are dependant upon the existence of two separate heaps, as claimed in Applicant's independent claims 1, 14 and 27.

For these reasons, the Stoutamire reference does not disclose, teach, or suggest the aforementioned elements of independent claims 1, 14 and 27 - namely, a contiguous linear portion of storage including a first heap and a second heap located at opposite ends of the storage portion, wherein any gap between the two heaps is in an unallocated region of storage. Thus, the Examiner's rejection of these claims has been traversed and the Applicant respectfully requests that the rejection is withdrawn.

Further, dependant claims 2, 10, 12-13, 15, 23, 25-26, 28, 36 and 38-39 depend from and include all of the limitations of independent claims 1, 14 and 27. For this reason, the Applicant

respectfully requests withdrawal of the Examiner's rejection and allowance of these claims.

First Rejection under §103

In the Office Action, the Examiner rejected claims 3, 5-6, 16, 18-19, 29 and 31-32 under 35 U.S.C. 103(a) as being unpatentable over Stoutamire in view of Bereznyi (US 6453404). The Applicant respectfully disagrees.

Dependant claims 3, 5-6, 16, 18-19, 29 and 31-32 depend from and include all of the limitations of independent claims 1, 14 and 27. For the reasons asserted above, the Stoutamire reference does not disclose, teach, or suggest the aforementioned elements of independent claims 1, 14 and 27. Further, the Bereznyi reference does not disclose, teach, or suggest the aforementioned elements of independent claims 1, 14 and 27. Thus, neither the Stoutamire reference nor the Bereznyi reference, nor any combination of the two, disclose, teach or suggest the aforementioned element of claims 3, 5-6, 16, 18-19, 29 and 31-32 - namely, a contiguous linear portion of storage including a first heap and a second heap located at opposite ends of the storage portion, wherein any gap between the two heaps in an unallocated region of storage. Thus, the Examiner's rejection of these claims have been traversed and the Applicant respectfully requests that the rejection is withdrawn.

Second Rejection under §103

In the Office Action, the Examiner rejected claims 11, 24 and 37 under 35 U.S.C. 103(a) as being unpatentable over Stoutamire in view of MacDonald (US 5696927). The Applicant respectfully disagrees.

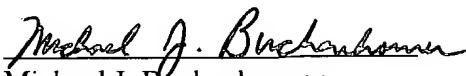
Dependant claims 11, 24 and 37 depend from and include all of the limitations of independent claims 1, 14 and 27. For the reasons asserted above, the Stoutamire reference does not disclose, teach, or suggest the aforementioned elements of independent claims 1, 14 and 27. Further, the MacDonald reference does not disclose, teach, or suggest the aforementioned elements of independent claims 1, 14 and 27. Thus, neither the Stoutamire reference nor the MacDonald reference, nor any combination of the two, disclose, teach or suggest the aforementioned element of claims 11, 24 and 37 - namely, a contiguous linear portion of storage including a first heap and a second heap located at opposite ends of the storage portion, wherein any gap between the two heaps in an unallocated region of storage. Thus, the Examiner's rejection of these claims have been traversed and the Applicant respectfully requests that the rejection is withdrawn.

Allowable Subject Matter

In the Office Action, the Examiner indicated that claims 4, 7-9, 17, 20-22, 30 and 33-35 contain allowable subject matter. The Applicant thanks the Examiner for this finding.

For the foregoing reasons, Applicant respectfully requests entry of the amendment and allowance of the pending claims.

Respectfully submitted,



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